Swarup Ranjan Behera, Ph.D.

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Professional Experience

Nov 2024 – Present	**Data Scientist,** NLP, ExxonMobil (EMSTPL), Bengaluru, India.
Sept 2021 – Oct 2024	**Research Scientist,** NLP-Speech, Reliance Jio AICoE, Hyderabad, India.
Jun 2021 – Aug 2021	**Research Intern,** NLP-Speech, Reliance Jio AICoE, Hyderabad, India.
Jul 2013 – May 2021	**Teaching Assistant,** IIT Guwahati, Guwahati, India.

Skills

Languages	Python, R, C, Matlab.
Frameworks	PyTorch, Tensorflow, Hugging Face Transformers, Databricks, FastAPI, Pandas, Gradio.
Expertise	**NLP:** Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), Seq-to-Seq Tasks, Cross-Lingual Tasks, NLU, NLG, Conversational AI, and Chatbots. **Audio:** Audio Language Models (ALMs), ASR, Audio Classification, Audio Captioning, Audio Retrieval, Audio Question Answering (QA), and Env Sound Analysis. **Computer Vision:** Vision Language Models (VLMs), Image Classification, Image Captioning, Image Retrieval, Visual QA, and Audio-Visual QA.
Misc.	CI-CD, Docker, Kubernetes, Azure, MySQL, MongoDB, GitHub, Linux, LaTeX.

Products

2023 **Call Audit Automation**
Developed a speech and text analytics system for call centers. Created an NLP pipeline for data processing and trained language models. Conducted sentiment analysis to enhance customer experience. Deployed at Jio and Ajio call centers, automating call audits with over 95% accuracy.

2022 **Patient Notes Conversion**
Developed a tool that converts spoken patient information into written notes, aiding doctors efficiently. Created an NLP pipeline for processing clinical text data and training medical language models. Currently operational at Reliance Hospital, generating SOAP notes with 94% accuracy.

Applied Projects

2024 **Indic LLM**
Building Indic LLMs by extending the vocabulary of pretrained tokenizers, followed by pretraining and fine-tuning on multilingual Indic datasets like Sangraha to tailor open source models such as Mistral and Llama for Indian languages.

Agriculture RAG and LLM
Building specialized LLMs for agriculture by fine-tuning open-source models like Mistral and Llama on agricultural data, and integrating them with RAG for precise, context-aware insights.

Art VLM
Building an Art VLM by fine-tuning open-source models like LLaVA on art datasets for improved visual art understanding, encompassing captioning, retrieval, and VQA.

2023 **Agriculture Time Series Analysis**
Developed time series models like ARIMA, LSTM, and Transformer to enhance decision-making and resource management in agriculture, advancing towards building Time Series LLMs.

Applied Projects (continued)

PDF Voicebot
Developed customized PDF voicebots integrating RAG on PDF documents with open-source LLMs for effective answer generation, deployed successfully across various domains.

2022 **Hospital Voicebot**
Implemented a voice bot system using ASR, Rasa NLU, and TTS modules to streamline call center operations for scheduling doctor appointments. Achieved a workload reduction of 20-30%.

Aspect-based Sentiment Analysis
Developed a model to extract aspects and sentiment from customer-agent interactions by fine-tuning a transformers-based model with domain-specific data. Integrated vernacular translation, enabling analysis of customer issues and sentiments in Indian languages.

2021 **Contract Review AI (CRAI)**
Developed a CRAI system that autonomously extracts and identifies key clauses from legal contracts, leveraging a BERT-based model for enhanced contract analysis and clause identification.

Education

2015 – 2021 **Ph.D.,** CSE, IIT Guwahati.
Thesis: *Learning Player-specific Strategies using Cricket Text Commentary.*

2013 – 2015 **M.Tech.,** CSE, IIT Guwahati.
Thesis: *Spectral Clustering Using Convex and Constrained Settings.*

2008 – 2012 **B.Tech.,** CSE, VSSUT Burla.
Thesis: *A Novel Ontology Based Entity Relationship Model.*

Awards and Achievements

2020-24 **PCM and Reviewer**, ECML-PKDD, IEEE VIS, TASLP, ICASSP, WACV, ICME.

2020 **Best Research Award**, Ohio State Sports Analytics Association Conference, Columbus, USA.

2013-21 **Grants and Fellowships**, MHRD Government of India Fellowship for MTech and PhD.

2013 **GATE 2013**, All India Rank 696 (99.68 percentile).

Selected Publications

1. O. C. Phukan, M. M. Akhtar, S. R. Behera, *et al.*, "Strong alone, stronger together: Synergizing modality-binding foundation models with optimal transport for non-verbal emotion recognition," in *ICASSP*, 2025.
2. S. R. Behera, A. Dhiman, K. Gowda, and A. S. Narayani, "Fastast: Accelerating audio spectrogram transformer via token merging and cross-model knowledge distillation," in *INTERSPEECH*, 2024.
3. S. R. Behera, O. C. Phukan, P. Mallick, A. S. Narayani, A. B. Buduru, and S. Rajesh, "Towards multilingual audio-visual question answering," in *INTERSPEECH*, 2024.
4. S. Jain, O. C. Phukan, S. R. Behera, A. B. Buduru, and R. Sharma, *Sequifi: Mitigating catastrophic forgetting in speech emotion recognition with sequential class-finetuning*, 2024. arXiv: 2410.12567.
5. O. C. Phukan, S. R. Behera, M. M. Akhtar, A. B. Buduru, and R. Sharma, *Beyond speech and more: Investigating the emergent ability of speech foundation models for classifying physiological time-series signals*, 2024. arXiv: 2410.12645.
6. O. C. Phukan, S. R. Behera, Girish, *et al.*, *Representation loss minimization with randomized selection strategy for efficient environmental fake audio detection*, 2024. arXiv: 2409.15767.

7. O. C. Phukan, S. R. Behera, S. Singh, *et al., Avengers assemble: Amalgamation of non-semantic features for depression detection*, 2024. arXiv: 2409.14312.
8. O. C. Phukan, S. Jain, S. R. Behera, A. B. Buduru, R. Sharma, and S. R. M. Prasanna, *Are music foundation models better at singing voice deepfake detection? far-better fuse them with speech foundation models*, 2024. arXiv: 2409.14131.
9. O. C. Phukan, D. Koshal, S. R. Behera, A. B. Buduru, and R. Sharma, *Multi-view multi-task modeling with speech foundation models for speech forensic tasks*, 2024. arXiv: 2410.12947.
10. O. C. Phukan, D. Singh, S. R. Behera, A. B. Buduru, and R. Sharma, *Investigating prosodic signatures via speech pre-trained models for audio deepfake source attribution*, 2024. arXiv: 2412.17796.
11. S. R. Behera, K. M. Injeti, J. S. K. Patibandla, P. K. Pokala, and B. R. Pailla, "Aquallm: Audio question answering data generation using large language models," *arXiv preprint arXiv:2312.17343*, 2023.
12. S. R. Behera, P. B. Reddy, A. M. Tripathi, B. R. Megavath, and T. Karavadi, "Towards multi-lingual audio question answering," in *INTERSPEECH*, 2023.
13. S. R. Behera and V. V. Saradhi, "Cricket player profiling: Unraveling strengths and weaknesses using text commentary data," *arXiv preprint arXiv:2311.06818*, 2023.
14. A. M. Tripathi, S. R. Behera, and K. Paul, "Adv-ifd: Adversarial attack datasets for an intelligent fault diagnosis," in *IJCNN*, 2022.
15. A. M. Tripathi, S. R. Behera, and K. Paul, "Investigation of performance of visual attention mechanisms for environmental sound classification: A comparative study," in *IJCNN*, 2022.
16. A. M. Tripathi, S. R. Behera, and K. Paul, "K-defensive bit planes: Defense against adversarial attacks," in *IJCNN*, 2022.
17. A. M. Tripathi, S. R. Behera, and K. Paul, "Reverse adversarial attack to enhance environmental sound classification," in *IJCNN*, 2022.
18. S. R. Behera and V. V. Saradhi, "Learning strength and weakness rules of cricket players using association rule mining," in *MSLA21, ECML/PKDD*, 2021.
19. S. R. Behera and V. Saradhi, "Mining temporal changes in strengths and weaknesses of cricket players using tensor decomposition," in *ESANN*, 2020.
20. S. R. Behera, P. Agrawal, A. Awekar, and V. S. Vedula, "Mining strengths and weaknesses of cricket players using short text commentary," in *ICMLA*, 2019.

References

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